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TRAINING FOR WAR INDUSTRY

Apprenticeship Training

BULLETIN No. 2

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DEPARTMENT OF LABOUR, OTTAWA

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INTRODUCTION

THE training of apprentices has been, and will always be, the backbone of any sound program of training in industry. Apprenticeship has a history dating back hundreds of years to the mediæval apprentice guilds but its form and content have altered from time to time to meet the changing conditions in industrial evolution. Unfortunately in recent years, the term apprentice has been very loosely used, and has been applied to the "breaking in" of new workers in all manner of occupations, regardless of the degree of skill required of them, or the length of time needed to acquire it.

The term "apprentice" should be restricted to young workers who are under an agreement with a company to learn a trade requiring at least 6,000 hours of practical work experience and classroom instruction in related subjects.

During the period 1930-39 the number of apprentices in Canadian industry was greatly reduced owing to the difficulty of providing continuous training and subsequent employment. However, with the increasing demand of war production, the country faced an acute shortage of labour in those more highly skilled trades which are recruited from those who have served apprenticeships lasting several years. In only three provinces are there apprenticeship Acts at the present time, and the trades designated under them are confined chiefly to building and construction and motor mechanics.

Acceleration of Training

Normally, the training of apprentices is a long range program which takes some years before its product is available to industry. But under the conditions prevailing during the war emergency, with its assurance of continuous training opportunities and practical work experience of different types, it is possible to accelerate an apprentice training program by condensing the content of training into a shorter period of time than normally considered necessary. However, there is a point beyond which such a procedure cannot be carried without impairing the efficiency of the training and seriously reducing the skill of the graduate apprentice.

It may be objected that a regular apprenticeship plan is too slow in producing results to be of much help during the war period. But does anyone know how long that period may be? It has already lasted nearly 2½ years—long enough to be of valuable assistance to those companies who inaugurated plans at its beginning. As already indicated, apprenticeship training can be "streamlined" to meet present conditions, and much of the initial instruction, particularly for tool-makers and machinists, can be given in the pre-employment training centres (described in the first bulletin of this series) by selecting apprentice material from the trainees coming from the classes for tool-room improvers or advanced machine shop practice, and providing credits both in time and wage rates for the progress made.

It is considered important that apprentice training should be supplemented by a system of up-grading and a plan of specialized job training. The one is a natural corollary of the other; but it cannot be too strongly emphasized that there is no substitute for apprentice training.

Basic Principles of Apprenticeship

Some apprentice programs form an integral part of collective labour agreements in industry: others are regulated by Provincial apprenticeship legislation, while still others are private plans established in individual companies. But whatever their nature, any sound apprenticeship program should include the following basic principles:

(1) A clear distinction between apprenticeship and short term or specialized learnership.

(2) A written indenture between the company and the apprentice, and his parent or guardian, if a minor.

(3) A careful initial selection of apprentices and a preliminary probationary period.

(4) A fixed period of apprenticeship—at least 3 years.

(5) Maintenance of craft efficiency by fixing definite schedules and standards of training with periodic tests and a diploma on satisfactory completion of the course.

(6) Definite periods for class instruction in related technical subjects with compulsory attendance and examinations.

(7) A progressive wage scale with increases at fixed intervals—possibly every 6 months. These increases may be made contingent on passing of tests.

(8) A definite ratio of apprentices to journeymen—to be adjusted for individual trades from time to time to meet changing industrial conditions.

(9) Adequate instruction and supervision of apprentices.

(10) Adequate records and progress reports of each individual apprentice.

Assistance to Employers

This bulletin is intended, particularly, for the information of employers. It gives a detailed description of four typical apprenticeship plans which are now in use and have proven satisfactory; it also contains two typical forms of indenture.

The Dominion Department of Labour is prepared to assist any employer engaged on war production in the formulation of an apprenticeship plan. With this objective, the Department has obtained the co-operation and assistance of a number of experts who are actively engaged in industrial training and personnel work. These have agreed to act as local advisers to firms desiring assistance, either in the formulation of a new plan of apprentice training, or in specific problems developing from any plan already established. Requests for such service should be directed to the Supervisor of Training, Department of Labour, Ottawa.

43080—1½

APPRENTICESHIP PLAN

CANADIAN NATIONAL RAILWAYS

Organized training of apprentices has been given for more than fifty years on the different roads that make up the C.N.R. but in 1931 a uniform plan was put into effect for the entire railway system and has been carried on without interruption. It is governed in part by the terms of the labour agreement between the railway management and the federated trades.

Administration and Supervision

The general supervisor of apprentice training at the head office has charge of all apprentice training for the system; he arranges the program and makes periodic trips of inspection. To him are sent all records and reports and the file of each individual apprentice including his application form and indenture. Periodic reports are sent in from the shops covering attendance, progress reports on shop and class training, including examination papers, special educational work, costs, etc.

There is a supervisor of apprentices in each region who consults and co-operates with the shop superintendents, foremen, class and shop instructors who are directly in charge of the apprentices. They deal with any matters pertaining locally to apprentice training.

Selection of Apprentices

The majority of apprentices are sons of employees. Great care is exercised in selecting suitable applicants. They must be between 16 and 21 years of age (at present 16 and 18) and have at least finished public school education. The great majority have several years either at High School or Technical School. The latter students usually make very successful apprentices. They must pass a physical examination by a company doctor and submit a report from the school last attended showing subjects studied and marks obtained. Each applicant must also pass a test in arithmetic and letter writing. A written indenture is completed for each apprentice signed by his parent or guardian and the employing officer for the railway.

General Conditions

Number and ratio of apprentices, wages, length of training

In order that they may be retained in the service of the railway, only sufficient apprentices are taken on annually to take care of the normal separations from the payroll. A survey and annual check determine what the number should be. The normal ratio is one apprentice to 7 journeymen but at present it is 1 to 5 which is the ratio allowed by the agreement with the federated trades. This ratio has never been exceeded. There are at present about 1,100 apprentices. The period of apprenticeship lasts five years with 290 days of 8 hours each constituting an apprenticeship year. Wages which are also covered by the agreement with the federated trades commence at 30 cents per hour and are increased every 6 months. For the first 3 years the increases are 3 cents and 2 cents per hour alternately. For the last 2 years the increases are 6, 7 and 9 cents per hour.

If any apprentice is not making satisfactory progress the instructor reports him to the shop superintendent whose approval is necessary for suspension but no apprentice can be dismissed from the service until approval is given by the general superintendent of motive power following receipt of a report by the regional supervisor.

Each apprentice must secure his own tools as he progresses through the different departments. A deduction of $1 per month for 50 months is made from the apprentice's wages to cover the cost of text books which remain his property. Fifty per cent of the total amount deducted is refunded on the completion of training to those who have averaged 75 per cent on the examinations in mathematics, mechanical drawing and trade theory. On the completion of his training each apprentice is given a certificate signed by the general superintendent of motive power and the general supervisor of apprentice training. He is also granted a two-year seniority.

Nature of Training

A progressive program covering shop work and class instruction is laid out in detail covering the following trades: machinist, boilermaker, blacksmith, pipefitter, electrician, sheet metal worker, carman, painter, upholsterer, patternmaker, moulder. Shop and class instructors devote their whole time to this work except in the smaller shops where part time is given to training and the balance spent on regular shop duties. Apprentices work in the regular departments of the shop and are moved from one to another to acquire general training. They are engaged in regular production work and are not advanced until the instructor or foreman is satisfied as to their progress.

The detail for the machinist apprentices is as follows:—

Machine Work, cutting studs, milling shoes and wedges, roughing bolts, boring spring and brake gear, engine lathe (light work) engine lathe (heavy work), fitting bolts, draw cut shaper, planer, shaper and slotter, motion lathe, boring mill—1½ months each. Tool room, electric shop—3 months each.

Fitting and Erecting, wheels and boxes, feed water heaters, steam pipes, boiler mountings, cab mountings, shoes and wedges, spring gear, cylinders and guide bars—1½ months each. Valve setting—3 months. Air brake and locomotive appliances—7½ months. Electric welding—3 months. Millwright shop—3 months. Roundhouse work—9 months.

Class Instruction

Two hours per week on company time (500 hours during apprenticeship) is spent in class room instruction covering mathematics, drawing, and trade theory. An annual examination is held and the results sent to the general supervisor of apprentice training. Periodic tests are also given by the instructor. The company maintenance regulations governing shop practices are used in teaching trade theory as are instruction books issued by the railway supply companies. The number of apprentices allotted to each class is from 10 to 15. In addition to the class instruction each apprentice must spend at least an additional two hours per week in home study. Many apprentices attend evening classes at Technical Schools and such attendance is encouraged. Arrangements are also made to allow apprentices leave of absence to attend university. There is no technical instruction by correspondence.

APPRENTICESHIP PLAN

BABCOCK-WILCOX-GOLDIE-McCULLOCH, LTD., GALT, ONTARIO

The apprenticeship program was established early in 1937 and includes Machine Shop Practice, Tool and Die Making, Pattern Making and Moulding. As the majority of apprentices are in the Machine Shop (and the other trades are operated along similar lines) this description will be confined to the operation of the Machine Shop Apprentice School.

Purpose

The purpose of the apprentice program is to train boys under seventeen years of age as qualified Machinists and Fitters to fill replacements in the Company's Machine Shop. A few of the highest ranking apprentices are transferred to the Tool Room as required.

Requirements for Admission

Application.—Apprentices are selected by application and personal interview under direction of Apprentice Supervisor. Applicants must not have attained their 17th birthday. There is no medical examination.

Education.—Preference is given to local boys who have attended Galt Vocational School for one year or more.

Number.—Average of six apprentices per year admitted.

Probation.—The first six months serve as a probationary period. An average of one boy per year fails to pass the probationary period.

Apprenticeship Agreement.—Upon acceptance as an apprentice, the applicant and his parent or guardian will be required to enter into an Apprenticeship Agreement with the Company.

Number of Apprentices

At the present time there are 23 Machine Shop Apprentices and 4 Tool Room Apprentices. Nine of these are in the Shop School. There is no fixed ratio of apprentices to

journeymen. The present ratio is one apprentice to five journeymen. There is no labour agreement concerning the number of apprentices.

Administration

The Apprentice Plan and School is in charge of an Apprentice Supervisor who is a fully experienced Tool and Die Maker. He has no other duties. The Apprentice Supervisor, Mechanical Superintendent and General Superintendent direct the policies and determine the nature of the training.

Duration of Apprenticeship

The term of Apprenticeship is for a period of four years, 2,400 hours per year. Fifty hours is the standard week.

Instructors

The Apprentice Supervisor acts as Instructor in the Shop School. In the regular shops, the Foremen and Machinists act as Instructors. The Foremen are on salary and the Machinists on Hourly rate. This permits them to give the necessary instruction without financial loss for time so spent.

Apprentice Shop School

There is a special area (26′ x 48′) set aside for the Shop School. Here the apprentices work under the direction and supervision of the Apprentice Supervisor during the first 18 months of their apprenticeship.

The School contains the following equipment: one Turret Lathe, 8′ bed, 14″ swing; one Engine Lathe, 8′ bed, 18″ swing; one Engine Lathe, 6′ bed, 16″ swing; one Atlas Shaper, 7″ stroke; one G & E Shaper, 16″ stroke; one No. 3 Cincinnati Milling Machine (Universal); one No. 3 Standard Universal Milling Machine; one Canadian Buffalo Bench Drill Press; one Heavy Duty Drill Press; one K & W Radial Drill; one No. 44 Cincinnati Gear Cutting Machine (48″ x 12″).

Class of work done.—Includes sleeves, brackets, pump and turbine parts.

Training Program

(*a*) *Shop Training:*

During the first two to three months of employment, the apprentice works in the store-room and sub-station where he learns how to make out work tickets and becomes familiar with the various types of supplies and machines. This training is not included in the first Apprenticeship year.

Apprentice School Shop..	18 months
Regular Departments of Factory engaged in regular production work....	30 months
Total.....	48 months

In the Shop School the apprentice is transferred from one machine to another usually in the following order: Small drill, radial drill, gear cutter, small milling machine, large milling machine, small shaper, large shaper, engine lathe, turret lathe, further training on engine lathe. Average time on each machine is approximately two months.

Some apprentices receive training on the Horizontal and Vertical Boring Mill.

There are no periodic tests. The Apprentice is judged on his daily work. A record is kept of the amount of time the apprentice spends on each machine.

No final certificate or diploma is given.

(*b*) *Technical Training:*

Classes for apprentices are held two nights per week, two hours per night, at the Galt Vocational School. Attendance at these classes is optional but the firm urges apprentices to do so. The main subjects taught are; Shop Mathematics, Blue Print Reading and Draughting. The regular Vocational Teachers do the instructing.

While attending the Evening Classes, the Apprentices are paid their regular wage rate and the time spent is allowed on the Apprentice Year.

Apprentices pay their own tuition fee and supply their own text books and school room supplies. The Company supplies each Apprentice with a Draughting Board, a Tool Kit at the end of the first Apprentice Year and pays one-half the cost of all tools purchased by the Apprentice (through the Company's Purchasing Department) during the Apprenticeship Agreement.

APPRENTICESHIP SCHOOL

FORD MOTOR COMPANY OF CANADA LIMITED, WINDSOR, ONTARIO

The Apprenticeship School was established in March, 1937, with an enrolment of thirty-one apprentices. Twenty-nine of these graduated into the Company's several Tool Rooms at the end of the third year of training. The present enrolment is one hundred and seventy students.

Purpose and Plan

The purpose of the Apprenticeship School is to train boys, between the ages of sixteen and nineteen years, inclusive, in Tool and Die Making. The object of the training is to provide the Tool Rooms with men who are thoroughly versed in methods used in the plants and to make it possible for boys thus inclined to obtain systematic and adequate training in their chosen trade.

Administration

The Apprenticeship School is in charge of an Apprentice Supervisor, Mr. J. F. Blowey, B.E. (Mech.); M.E.I.C., who reports direct to the Superintendent of the Machine Shop. These officials along with the Head Office Executives concerned direct the policy and determine the nature of the training to be given.

Requirements for Admission

Application.—Applicants for apprenticeship must be between sixteen and nineteen years of age, inclusive, and be able to pass a standard medical examination by one of the Company's physicians. The apprentices are selected through application and personal interview. That the selection has been careful is demonstrated by the fact that out of 134 apprentices admitted to the school, only three have been released during the probationary period as unsatisfactory.

Education.—The apprentice must have satisfactorily completed at least two years training in a recognized High School, Technical School, or its equivalent.

Probation.—The first six months serve as a probationary period.

Apprenticeship Agreement.—Upon acceptance as an apprentice, the applicant and his parent or guardian will be required to enter into an Apprenticeship Agreement with the Company.

Number of Apprentices

At the present time, one hundred and twenty apprentices are enrolled. There is also a Special Class for older men recruited from War Emergency Training Classes, Windsor, and from the Company's own employees who had previously attended High or Technical School and who have shown an aptitude and capacity for further mechanical training.

There is no definite or fixed ratio of apprentices to journeymen. The present ratio is approximately seven journeymen to one apprentice.

The apprenticeship plan is not part of any labour agreement.

Duration of Apprenticeship

The term of apprenticeship is for a period of four years. The first three years are served in the Apprentice School and the last year in one of the Company's several Tool Rooms.

Instructors

The Apprentice School Staff consists of the Supervisor, Assistant Supervisor and nine Machine Shop Instructors (*three* for each shift).

The Supervisor and Assistant Supervisor give the instruction in all classroom subjects which is in session eight hours per day. These subjects include Mathematics, Drawing and Blue Print Reading, Shop Practice Lecture and Shop Theory.

The Machine Shop Instructors are fully conversant with the many practical problems arising as they have been carefully selected from the Company's Tool Rooms.

During each shift, one Instructor is in charge of the Lathe Department, another the Grinding Department, while a third Instructor supervises instruction on the Milling Machines, Shapers, Slotter and Jig Borer. The Instructors have no other duties.

Training Program

Hours of Operation

Day Shift 7.30 a.m.-3.30 p.m. 62 apprentices, Afternoon Shift 3.30 p.m.-11.30 p.m. 58 apprentices, Night Shift 11.30 p.m.-7.30 a.m. 50 students (older men). The curriculum was originally set for five days per week;

eight hours per day. Due to the war emergency and increased production, it is now operating six days per week.

Type of work

All work done in the Apprentice School is definitely of a Tool Room nature. All tools made are used in the plant on regular production. No practice projects are carried on. There is no production of the Company's saleable product.

The apprentices work to very close tolerances. On a piece of work picked up at random, the specifications allowed a tolerance of plus ·0002 to minus ·0000. On the amplifier, the piece selected showed a variation of ·0001.

Work done by the Apprentices includes:— Adjustable Drill Holders, Bushings (Bronze), Broach Pullers, Copper Rolls for Seam Welders, Copper Points for Welders, Centre Punches, Chuck Jaws, Cutters for Chuck Jaws, Cutters for Cold Heading Machine, Chuck Inserts, Cams, Cutter Blades, Drill Bushings, Drills, Guide Pins, Gearing (Worm, Bevel, Spur), Holders for Spotfacers, Holddowns for Shapers, Jaws for Butt Welders, Keys, Lathe Centres, Liner Bushings, Lathe rockers, Machine Parts, Pulleys, Push Pins, Punches, Pilots for Spotfacers, etc., Points, Point holders for Welders, Rivet Sets, Round Nuts, Reamers, Rollers, Shoulder Screws, Screws, Sharpening and Shaping special form Tools, Spotfacers and Counterborers, Standard Tap Chucks and Parts, Standard Conveyer Trolley Wheels, Standard Punches, Standard Button Dies, Standard Thrust Washers, Shafts, Spur Gears, Springs, Tips and Holder for Arc Welders, Tool Bits, Machine Parts, Component Parts of Jigs and fixtures, Component Parts of Dies, Die sections of all kinds.

(*a*) *Shop Training*

Approximate Schedule for a period of Three Years

First Year—Tool Crib 5 weeks, Drilling Machine 6 weeks, Shaper 8 weeks, Lathes 32 weeks, Tool Hardening 1 week.

Second Year—Cutter Grinder 6 weeks, Miller (Horizontal) 10 weeks, Miller (Vertical) 9 weeks, Grinder (Surface) 9 weeks, Lathe 8 weeks, Slotter 3 weeks, Screw Machine 6 weeks, Tool hardening 1 week.

Third Year—Horizontal Miller 8 weeks, Grinder (Surface) 6 weeks, Grinders (External) 9 weeks, Shaper 7 weeks, Grinders (Internal) 6 weeks, Lathe 8 weeks, Grinder (Universal) 3 weeks, Inspection 4 weeks, Tool Hardening 1 week.

Fourth Year—Tool and Die Dept. 12 months.

Syllabus of Shop Training

Space will not permit giving details of each type of training. The following will serve as examples:—

Lathes: (48 weeks)

Includes instruction in the attachments and mechanisms used on the machine; the proper use of centres; boring; threading; facing, and taper turning.

Speeds and feeds necessary for each type of operation; turning; boring; etc.

Correct chucking to avoid distortion.

Grinders: (30 weeks)

The apprentice learns the principles involved in grinding within the limits of the blueprints; the use of precision instruments such as the vernier, height gauge, telescope gauge; micrometer; depth gauge; the care of a magnetic chuck; the grinding of tapers; the setting up of parts for the internal grinder. He will also be instructed what grade of wheel is to be used in order that the fastest speed may be used without burning or warping the material; the care and use of a diamond and other dressers in dressing the wheel.

Milling Machines (27 weeks)

Apprentice taught the care, adjustments and characteristics of the machine; the proper use of the dividing head; centres; collets; vises; the clamping of the part; side mills; end mills; and boring tools.

Shapers (15 weeks)

An apprentice starting on the shaper becomes familiar with the care and adjustments of the machine; the feeds, speeds, and types of tools used in machining different metals (such as copper compared to high speed steel). He learns how to machine his work square, at an angle, and to a line, as per layout according to blueprint specifications.

Tool and Die Department

General Work (52 weeks)

This embodies the practice of the principles learned from his preceding work. He is given the opportunity to make the part complete, using his own initiative in regards to planning the sequence of operations. He is also given bench work including assembly and repair of indicators and various inspection gauges.

Inspection Department

In order to give the apprentice experience and training in Inspection Work, the Apprentice School operates its own Ispection Department. All work done in the School is inspected before being sent to the Company's regular Tool Room Inspection Department. Senior students do the inspecting in the Apprentice School.

Shop Equipment

The following equipment is used exclusively by the Apprentice School: 22 Engine Lathes, 3 Turrett Lathes, 7 Shapers, 10 Millers, 1 Jig Borer, 5 Drill Presses, 18 Grinders (External, Internal, Surface and Rotary), 4 Tool Grinders, 1 Marking Machine, 1 Demagnetizer, 1 Centering Machine, 2 Arbor Presses.

This equipment is set up on a floor space 85 feet by 66 feet allowing ample room around each machine. The Lecture Room occupies a space of 40 feet by 17 feet and accommodates 18 students.

Handling of Shop Work

General Stores sends official order and copy of blueprint to Apprentice Supervisor. He orders the material and supervises the work through the different Departments of the Apprentice School.

(*b*) *Technical Training*

Ten per cent (10%) of the Apprentice's time is spent in the Lecture Room during working hours, under the supervision of Apprentice Supervisor and Assistant Supervisor. This period is reckoned on the basis of a five-day week. Classroom instruction is not given on Saturday. Student receives the regular rate of pay during classroom instruction period.

Classroom Instruction

Each apprentice receives four hours' instruction per week as follows:—

Shop Mathematics—1 hour per week

Includes review of previous mathematics; Trigonometry; six ratios defined; use of tables; solution of right triangles; function of any angle; solution of oblique triangles; application to shop problems, gear design and compound angles.

Drawing—2 hours per week (1 hour per week, Blue Print Study, 1st three months).

Proper care and use of equipment; practice in perfecting lines; arcs; letters and figures; applications in geometry; orthographic projections with problems in auxiliary views; locating and sizing parts with dimensions correctly placed; conventional drawing of threaded parts; sectional views to give supplementary information; detail parts of an assembly giving specifications for their manufacture and use. Technical, free hand sketching; isometric drawing; intersections and developments of surfaces; true length of lines and true size of surfaces; commercial tools and standard parts; limits; tolerances and fits; perfected working drawings of a complete machine; checking drawings; drawing the assembly.

Shop Practice Lecture—1 hour per week

The methods, procedures and applications of jigs, fixture, machinery; cutting speeds and feeds and lubricants used; the sequence of operations from the rough to the finished parts; the application of various types of inspection equipment.

Free Tool Kit

The Company supplies, free of charge, first year text books and Apprentice Tool Kits. These kits are similar to Starrett No. 900 and consist of a Combination Square, Centre Punch, Hermorphidite, six-inch flexible scale, inside and outside calipers, dividers and centre gauge complete with leather case.

Text Books used:

Applied Mechanical Drawing—Paull and Sgro—D. Van Nostrand Co., Inc., New York City, N.Y., U.S.A.

Practical Shop Mathematics (Volume 1, Elementary)—Wolfe & Phelps—McGraw-Hill Publications, New York City, N.Y., U.S.A.

Practical Shop Mathematics (Volume 2, Advanced)—Wolfe & Phelps—McGraw-Hill Publications, New York City, N.Y., U.S.A.

Shop Theory—Henry Ford Trade School—Henry Ford Trade School, Dearborn, Mich.

Progress Reports

A student receives grading on Lecture Room subjects weekly. In the practical machine shop work, the apprentices receive a rating each time he moves from one type of machine to another.

A special Progress Chart is prepared for each apprentice and shows his standing at any given date. See sample of Progress Chart hereunder.

The attached rate sheet analysis and "Key" explains the basis of the ratings.

Apprentice Wages

Rates of pay: 1st year—40 cents per hour, 2nd year—50 cents per hour, 3rd year—60 cents per hour, 4th year—75 cents per hour. Time and one-half paid for over 8 hours in one day and over 40 hours worked in one week.

Deductions: Five cents per hour of apprentices' wages is retained by Company until the end of each working year when accumulated amount is paid in lump sum. This helps the apprentice budget for tools, clothes, etc.

FORD MOTOR COMPANY

TRADE SCHOOL PROGRESS REPORT

Name.....*John Doe*..... Badge No.....*0-0013*.....

Address.....*210 Bank Street*..... Group No.....*3*.....

Age.....*18*..... Date on Course.....*Apr. 3/40*.....

Education....*2½ years Technical School* Date off Course.....

Machine	Weeks	Grade	Weeks	Grade	Weeks	Grade	Weeks	Grade	Weeks	Grade	Weeks	Grade	Weeks	Grade	Weeks	Grade
Tool Crib																
Drill Press																
Shaper	8	81														
Lathe	11	83	9	86	2	87	9	87								
Screw Mach.																
Miller-Vert.																
Miller-Hor.																
Int. Grinder																
Surf. Grinder	6	79	4	66												
Ext. Grinder	6	88														
Cutter Grinder	3	73														
Slotter	2	82														
Inspection																
Heat Treat	1	75														

Apr. 3/40—77%
May 15/41—81%

MATHEMATICS

Date	June	Sept.	Dec.	Mar. '41	June	Sept.						
%	88	85·1	61·7	56·7	72	68						

DRAWING

Date	June '40	Sept.	Dec.	Mar. '41	June	Sept.						
%	86·3	80	80·5	71	71	65						

Remarks:.....

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In compiling the rating chart for our Apprentice School, we wish to give credit to A. S. Knowles, Northeastern University, Boston, and A. L. Kress, National Metal Trades Association, for ideas gained from reading their articles.

Also an ideal curve is based on the following grouping: 6 per cent superior, 22 per cent above average, 44 per cent average, 22 per cent below average, 6 per cent unsatisfactory.

KEY TO RATING CHART

	A	B	C	D	E	F	G	H
Quality	25	23	20	18	15	13	10	8
Productivity	20	18	16	14	12	10	8	6
Adaptability	15	13	12	10	9	7	6	4
Skill and Experience ...	20	18	16	14	12	10	8	6
Dependability	10	9	8	7	6	5	4	3
Attitude	10	9	8	7	6	5	4	3

FORD APPRENTICE RATING CHART

Factors	A	B	C	D	E	F	G	H
QUALITY								
Accuracy Proficiency	Excellent work. Very accurate.	Excellent work. Accurate.	Good work.	Good work. Errors.	Work within limits. Average.	Work within limits. Errors.	Careless, Errors	Careless, frequent errors.
PRODUCTIVITY								
Accurate Work Completed	Very high	High.	More than expected.	Expected quality.	Average student output.	Below average student output.	Slow.	Extremely slow.
ADAPTABILITY								
Shown when student changes from machine to machine.	Changes with little effort.	Adapts himself very quickly.	Adjusts himself with little difficulty	Adjustment made with a little instruction	Must be given detailed supervision.	Must be given detailed supervision and follow-up.	Slow to adapt himself.	Very slow to adapt himself.
SKILL AND EXPERIENCE								
	Very proficient and wants to know more.	Good.	Thinks about his project and plans.	Seeks advice to speed project.	Fair.	Without fail will require supervision.	Knowledge limited; very haphazard.	Little desire for improvement.
DEPENDABILITY								
Steady worker; reliable.	Confident of the student's ability and efforts.	Student will give his best.	Will follow all instructions.	Will follow instructions with prompting.	Generally dependable.	Occasionally needs checking.	Frequent checking.	Frequent checking on routine work.
ATTITUDE								
Co-operate.	Exceptionally good in co-operating with Company and fellow employees.	Good in co-operation.	Willing to try, but does his share only.	Does his share only.	Reluctant to try new ideas. Co-operates.	Fair.	Co-operates only because it is part of his job.	Student has little interest in his job.

APPRENTICESHIP PLAN

GENERAL MOTORS OF CANADA LIMITED, OSHAWA, ONTARIO

The Apprenticeship Program was established in July 1938, with 30 apprentices enrolled. The present enrolment is 45 apprentices.

Purpose and Plan

The purpose of the apprentice program is to train young men, between seventeen and twenty years of age, inclusive, in the following trades: Tool and Die Maker—5 years; Machinist, Draftsmen, Pattern Maker, Millwright, Plumber, Electrician—4 years.

Requirements for Admission

Application.—Applicants for apprenticeship must not be less than seventeen years of age. They must pass the Plant Doctor as physically sound, and be of good moral character.

Education.—Preference will be given to those applicants who have received at least two years training at a recognized Vocational or Technical School.

Probation.—Each applicant for apprenticeship will be on trial for approximately six months before entering into an apprenticeship agreement. Such probationary period, in the event of the applicant being accepted, will count as part of his apprenticeship. At any time during or at the end of this period of probation a decision will be reached by the company as to whether or not the applicant is considered suitable for apprenticeship.

Apprenticeship Agreement.—Upon acceptance as apprentice, the applicant and his parent or guardian will be required to enter into an apprenticeship agreement with the Company. Apprentices will, at all times, be subject to Company rules and regulations.

Number of Apprentices

Number of apprentices to be enrolled each year should be consistent with skilled work requirements of plant and normal replacements caused by turnover.

There is no fixed ratio of apprentices to journeymen nor is the Apprentice Program part of any labour agreement.

Administration

The Apprenticeship Program is under the direction of the Industrial Relations Manager who, along with the Shop Foremen, directs the policy and determines the nature of the training to be given.

Instructors

The apprentice is assigned to an experienced journeyman and works in the shop concerned under his direction and instruction. Being paid an hourly rate, the journeyman does not suffer any financial loss during the time he is instructing the apprentice. The apprentice may be placed under the direction of first one journeyman and then another, etc., in order to give him a thorough all round training in his chosen trade.

Training Program

Hours of Operation.—The apprentice works the standard number of hours the plant operates but is not required under normal conditions to work for a greater period than 44 hours in any working week nor, if under the age of 18 years, to work on a night shift. These restrictions, however, have been removed during the War Emergency.

Should the apprentice lose time by reason of illness, certified by a duly qualified medical practitioner, he will be given every possible help to make up the number of hours lost before his apprenticeship can be concluded.

The Company reserves the right, whenever the state of business requires it, to shorten the hours of any period. In the event of business conditions being such as to require the temporary suspension of apprentices, the making up of time so lost shall be at the discretion of the Company.

Type of Training

(*a*) *Shop Training*

APPROXIMATE SCHEDULE FOR APPRENTICESHIP PERIOD

Tool and Die Makers (14 apprentices)

	Months
Tool Crib	3
Drilling (Speed drills and up to 24" Drilling Machines)	3
Shapers	3
Lathes	3
Vertical and Horizontal Milling Machines	6

TYPE OF TRAINING—*Conc.*

	Months
Surface Grinding	3
Cylindrical Grinding (Internal and External)	3
Drafting Room (Tool and Die Design)	3
Inspection Department	3
Heat Treating, Blacksmith Shop, Arc and Acetylene Welding	6
Heavy Machine Work, Planer, Vertical and Horizontal Boring	3
General Bench Work, Radial Drills, Filing Machines	6
Tryout and repair work for production	3
Assembly and building of new dies, jigs and fixtures	12
Total	60

Machinists (16 apprentices)

	Months
Helper in Machine Shop Tool Crib	3
Small Bench lathe work, Blacksmith and tool hardener's helper	6
Drafting room, blueprint reading, detailing, etc.	3
Machine work	12
Machine work	12
Machine work, estimating department	3
Machine work	9
Total	48

Draftsmen (5 apprentices)

	Months
Drafting office routine, filing, etc.	3
Drafting office detailing	9
Drafting office designing of tools and body jigs	6
Drafting office designing of tools and body jigs	6
Drafting office advanced design of tools and welding equipment	6
Drafting office advanced design of tools and welding equipment	6
Drafting office die design and welding equipment	12
Total	48

Pattern Makers (2 apprentices)

	Months
Learning to make mill forms and assembly fixtures	3
Simple pattern making	6
Drafting room for blueprint reading, detailing, etc.	3
Making small patterns	12
Advanced pattern making	12
Making models, spotting blocks, etc.	12
Total	48

There are also 4 Millwright Apprentices, 3 Electrical Apprentices, and 1 Plumber Apprentice.

(*b*) *Technical Training*

Outline of Theoretical Training for Apprentices conducted, Monday mornings, at Oshawa Vocational School under direction and instruction of regular School Staff.

Draftsmanship — Blueprint reading and Sketching.

Shop Mathematics—Special emphasis on the elements of trigonometry; Theory of reading micrometer and Vernier gauges; Screw thread styles and measurements; Decimal equivalents, tapping sizes; Machine speeds and feeds; Translation of Protractor readings.

Mechanics—Elements of machine structure design; Strength of materials; Gear cutting (pitch diameter, circular pitch, etc.).

Metallurgy—Elementary knowledge of metal structures; Theory of steel treatment; Case hardening, etc.

Foundry Practice—Metal shrinkage; Types of wood for patterns, etc.

Electrical—Elements of electricity; Insulating values; Hydro-electric regulations.

Plumbing—Sheet Metal layout; Sheet Metal drafting; Elementary principles of heating and ventilation.

Science—Heat; Physical Properties of Plastics.

It will be obligatory for all apprentices to carry out technical studies, taking such course as may be prescribed by the Company from time to time. Until the end of the fourth period, apprentices will be required to attend certain classes held in the daytime at the Oshawa Collegiate and Vocational Institute.

Arrangements will be made by the Company whereby the apprentice will receive credit hours and wages during such absences from the factory.

In addition, at such times that certain evening continuation classes are held, apprentices will be expected to attend by arrangement between the Company and the local educational authorities, but at their own expense.

All apprentices of the fifth to final periods will be expected to attend evening continuation classes at their own expense. During these periods of supplementary education, the progress of each apprentice will be carefully checked from time to time, with the school principal and teachers of such classes.

PROGRESS REPORTS

The Apprentice Shop Record shows the number of hours worked by the apprentice on each machine operation. If, at the completion of the regular apprenticeship period, the foreman does not believe the apprentice is yet qualified as a journeyman, the apprenticeship period may, at the foreman's discretion, be extended.

APPRENTICE WAGES

The hourly rate of wages is 35 cents for the first 6 months with increases given at the end of each six-month period. The first

increase is 2 cents per hour and the subsequent increases are 3, 2, 3, 5 cents per hour every 6 months.

Deductions

An apprentice shall be allowed, at his option, to take advantage of the Company's group health and life insurance scheme in the same manner as regular employees of the Company under the present Company policy.

Completion of Apprenticeship

Upon completion of the working periods called for in the form of agreement, the apprentice will receive a certificate, signed by the General Manager of the Company, clearly stating the trade at which he has worked, and thereby certifying that he has completed his apprenticeship, thus terminating the apprenticeship agreement. The Company also assists apprentices financially to purchase precision tools.

Subsequent Employment

Every effort will be made, upon completion of apprenticeship, to immediately place the apprentice in work of his trade, at the rate of pay for a journeyman in his class of efficiency. The matter of placement, however, will depend upon the requirements of the Employment Manager at the time of availability.

Discharge

The Company reserves the right, in its sole discretion, to discharge any apprentice from its employment during any part of his apprenticeship for failure to conform to Company rules and regulations, lack of industry, indifference to duties, improper conduct within or without the Company premises, or for any other sufficient cause. Upon discharge of the apprentice as aforesaid the apprenticeship agreement shall be thereby terminated.

APPRENTICE AGREEMENTS

INDENTURE OF DOMINION BRIDGE COMPANY

This Agreement made in triplicate this ..... day of ..... 19.., between DOMINION BRIDGE COMPANY, LIMITED, of Lachine, Quebec, hereinafter referred to as the "Employer" and .... of ....., hereinafter referred to as the "Apprentice", and ..... of ....., hereinafter referred to as the "Guardian", whose relation to the Apprentice is that of.....

For the purpose of acquiring the practice and theory of the trade of..... as per exhibits ..... and ..... hereto attached, said .... becomes an Apprentice to said Employer and said Employer hereby accepts him subject to the terms herein stated, and to the Rules and Regulations hereto attached and which are made a part of this Agreement, and such other rules and regulations as may be in force at the time of signing of this Agreement or thereafter in effect.

1. The Apprentice and his Guardian hereby promise that the Apprentice shall conform to and abide by all the provisions of this Agreement, and shall faithfully serve his Employer during the full period of time named in this Agreement.

2. The Apprentice and his Guardian agree that the Apprentice shall do all in his power to learn said trade during the period of his apprenticeship. They also agree that at the end of the probationary period, or trial term, stated in Rules and Regulations hereto attached, the Apprentice shall enroll and pay (by wage deductions) for a course of study related to his chosen trade, with a recognized correspondence school selected by the Employer, and that he shall attend a study class after regular scheduled working hours, for which the scale of pay herein set forth does not apply. The Apprentice shall be expected to do a reasonable amount of home study as required by the correspondence school, and the Employer's class room supervisor.

3. It is further agreed by the Apprentice and his Guardian, that the Employer shall have the right to dismiss the Apprentice for inability to do the work or acquire the knowledge necessary for the completion of his trade, or for infraction of Rules and Regulations governing Apprentices; to rearrange his working hours or to increase or decrease the rates of pay hereinafter mentioned should the condition of business, in the Employer's opinion, warrant such action.

4. The practical shop training as per exhibit ..... will consist of a specific training in some shop department where the Apprentice will spend the major portion of his time. He will also at times have a brief period of training in other shop departments to round out his practical training.

5. Class-room work will consist of a prescribed course of study with a recognized correspondence school, as per exhibit ....., which the Apprentice will attend for at least four hours each week. This course consists of the related technical information necessary to supplement the shop training so that together they constitute a well rounded out program.

6. The Employer agrees to assign certain members of his organization to the tasks of Apprentice Supervisor and Class-room supervisor who will always be ready to assist the Apprentice with his shop and class-room problems.

7. It is agreed by the Employer and Apprentice and his Guardian, that the period of Apprenticeship shall be..... working hours, or approximately ..... years.

8. The Guardian of said Apprentice, on his or her part, agrees that the Employer shall pay to the Apprentice all wages which may become due for his services.

9. The Employer shall pay the Apprentice for services rendered as follows:—

(Increases given every 675 working hours.)

10. The Apprentice shall have the right to terminate this Agreement for personal reasons satisfactory to the Employer, and the Employer shall furnish a statement terminating the Agreement without stigma to the Apprenice.

In Witness Whereof we have hereunto set our hands and seal, this ..... day of ....., 19....

.....
Witness

.....
Apprentice

.....
Witness

.....
*Parent or Guardian

.....
Witness

.....
Employer

*Father should sign if living and available, otherwise mother, Legal Guardian should sign in absence of parents.

RULES AND REGULATIONS GOVERNING APPRENTICES

1. An applicant for Apprenticeship under this Agreement must be not less than Seventeen (17) years of age, proof of which must be furnished in the form of birth or school certificate. He must be able to read and write in the English language and have sufficient educational qualifications to successfully pass a written entrance examination in the following subjects: Elementary Arithmetic, Fractions, Decimals, Weights and Measures, Ratio and Proportion, Powers and Roots, and Mensuration.

2. The period of Apprenticeship for Apprentices with Technical School Training or previous shop Experience in the trade chosen, shall be shortened in proportion to the extent of that training or experience, by allowing credits on their wage and operation schedules as mentioned below. Proof of such training or experience must be furnished in the form of a Technical School Certificate, or a letter from previous employers, stating the operations worked on.

	Credits allowed	
	Wages per hour	Hours
Completed 4 years' Technical School	4 cents	1,350
Completed 3 years' Technical School	2 cents	675
Completed 4 years' Shop Experience	4 cents	1,350
Completed 3 years' Shop Experience	2 cents	675

3 Apprentices shall adhere to and abide by all shop rules and regulations.

4. The first 675 working hours of apprenticeship shall constitute a probationary period, or trial term. The Apprentice shall receive credit for the time served during the probationary period, when it is satisfactorily completed.

5. The Agreement hereto, attached does not take effect until the probationary period has been satisfactorily completed, and may be annulled by either the Apprentice or the Employer during the trial term.

6. All lost time must be made up before passing from one pay division to another.

7. The Employer reserves the right to suspend work in the Shop, wholly or in part, at any time it may be deemed necessary. In such cases the Apprentice shall be paid only for the actual time he shall work. An Apprentice who has been suspended under such conditions shall have the option of resuming training before any additional apprentices are employed.

8. Should the conduct of the Apprentice, within or without the shops, or his work not be satisfactory to the Employer, the Employer reserves the right to dismiss the Apprentice at any time without previous notice, but he may be reinstated after a conference between the Employer and the Parent or Guardian.

9. Each Apprentice who has faithfully and satisfactorily completed his Apprenticeship and has received a Diploma from the correspondence school, as herein provided for, shall be presented with a Certificate of Apprenticeship, and shall be reimbursed the cost of his correspondence course, provided he is still in the service of the Employer. An Apprentice who may not have received a Diploma from the correspondence school, but who has otherwise fulfilled the conditions of his Apprenticeship, shall be presented with a Certificate of Apprenticeship.

INDENTURE OF CANADIAN NATIONAL RAILWAYS

This Indenture made in duplicate the ..... day of ..... A.D. 19..; Between ..... of the ..... of ..... in the Province of ..... of the first part, ... of ..... son (or ward) of the party of the first part, and now of the age of .... and hereinafter called the "minor" of the second part, and the Canadian National Railways, hereinafter called the "Company", of the third part.

Witnesseth as follows:

1. That the said party of the first part, with the consent of the said minor, testified by his executing these presents, doth hereby place and bind him, the said minor, as a apprentice to the said Company to learn the art and trade of ..... for the term of ..... years from this date, and on the ..... day of ..... A.D. 19.... to be fully completed and ended, subject, however, to the conditions in what is known as the current Wage Agreement governing reduction in staff.

2. That the said parties of the first and second parts, each for themselves and their, and each of their respective heirs, executors, administrators and assigns, hereby covenant, promise and agree, with the Company, its successors and assigns:

(*a*) That during the whole of the term above mentioned, he the said minor shall and will, well and faithfully, serve the said Company, will keep its business secrets, and will at all times readily and cheerfully obey all its lawful commands. and those of its foremen and other superior officers, and shall give and

devote to the Company his whole time and labour during working hours, and shall in all things behave and conduct himself as a faithful apprentice towards the Company, its foremen, officers and employees.

(*b*) That the said minor will not during the said term join or become a member of any fire company, except such fire companies as he may be requested by the Company in writing to join.

(*c*) That the Company, its foremen, or other superior officers, may at any time or times during the said term, assign and appoint the said minor to the performance of such work at his own trade as may be required in any other branch or department of the business of the said Company and for such length of time as the Company may desire, and that the said minor will well and faithfully do and perform such work to which he may be so assigned.

3. The said Company hereby agrees to take the said minor as an apprentice and give him the opportunity to learn the said art and trade, and the Company hereby covenants and promises to pay to the said minor (payment to whom is hereby consented to by the party of the first part) for his faithful services during the term above named to be performed, the apprentice rates mentioned and provided for in the said current Wage Agreement for the time actually worked by the said minor, to be paid on the Company's regular pay days.

4. Nothing herein contained shall bind the Company to keep the said minor as an apprentice should he become insubordinate, guilty of misconduct, neglectful of duty, inefficient or unsatisfactory to his foreman, or other superior officer, in any respect, and the Company through the said foreman or superior officer shall have full power to discharge the said minor from the service of the Company for any good cause.

5. It is further agreed and understood that if during the first six months of the said term it shall appear to the Company, its foreman, or other superior officer, that the said minor is unfit physically or mentally to learn or acquire the said art and trade, it shall be lawful for the said Company to declare this agreement at an end and to discharge the said minor from its employment, subject to the provisions in said current Wage Agreement applicable to the said minor, but if in such case and for such cause only the said minor be dismissed he shall not thereby forfeit any wages due him by the said Company.

6. It is also agreed and understood that the said minor shall, during the said term of this apprenticeship, attend such classes for instruction in mechanical drawing and practical mechanics as the Company may arrange for, and that if the said minor fails to do so, the said Company shall have the right to declare this agreement at an end and to discharge the said minor from its employ.

7. It is especially understood and agreed that the said minor shall make up to the said Company any time which he may have lost during the said term of apprenticeship by whatever cause it may happen from time to time, before he shall be deemed to have fully completed his said apprenticeship.

8. Notwithstanding anything in this agreement contained, it is expressly understood and agreed between all the parties hereto that the Company shall be under no obligation to provide the said minor with suitable board, lodging and clothing, except as provided for in said current Wage Agreement, or to educate him, otherwise than herein provided, and the payments herein above mentioned and provided to be paid by the Company to the said minor are expressly declared to be in lieu of any obligation, implied or otherwise, which might arise by reason of the making of this agreement.

In witness whereof the said parties of the first and second parts have hereunto set their respective hands and seals, and the name of the said Company has been subscribed and attested by the hand of its ..... on the day and year first above written.

Signed, sealed and delivered, in the presence of

.....(L.S.)

.....(L.S.)

The Canadian National Railways

per

.....